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ABSTRACT

This working paper provides an initial discussion point for the construction of a national location service as a component of a national library and information service network. The study described had a dual purpose: (1) expansion of the Register of Additional Locations (RAL) data base by cooperative means, which involved identifying machine-readable data bases from which location reports could be obtained; and (2) a survey of users of the microform edition of the RAL to determine their requirements for location information and what improvements could be made. The survey was expanded to include all subscribers to the National Union Catalog (NUC) who receive the RAL as part of their annual subscriptions. A summary of responses, and detailed descriptions of the conclusions and recommendations are included. Distribution of the RAL in machine-readable form is recommended, allowing local or national entities the option of developing such online access as they find desirable. (Author/MBR)

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PREFACE

This document represents the final report prepared by Brett Butler of Butler Associates, Los Altos, California, under contract to the Library of Congress Network Development Office. Funds for conducting this study were provided by the Council on Library Resources, Inc., whose support is gratefully acknowledged.

At the beginning of the project, several components of a national location service had already been set in motion at the Library of Congress. Location information for monographic materials in the form of reports appearing in the Register of Additional Locations (RAL) had been converted to machine-readable form beginning with data that eventually were published in volumes 114-18 of the 1968-72 quinquennial issue of the National Union Catalog (NUC) and thereafter for data that appeared in the printed annual cumulations of the RAL. Although machine processing expedited the preparation of copy for the RAL, the publication's availability to users remained a problem because of delays in the printing and binding process. The Library of Congress then turned to an experimental microform edition produced through a computer-output-microfilm (COM) process that presented in one sequence the location reports from the 1968-72 quinquennial and each supplement through 1975. The microform edition not only appeared much sooner than the printed RAL but also contained many more location reports than possible before.

The Library of Congress also investigated the feasibility of obtaining location reports in machine-readable form from outside libraries. Since many of the large contributors to the NUC and its supplement, the RAL, have automated bibliographic systems from which cataloging copy and location information can be derived, it appeared to be beneficial for both the outside libraries and the Library of Congress if location reports could be submitted in machine-readable form. The outside libraries would then not have to generate extra printed cards for submission to the NUC/RAL, and the Library of Congress would not have to reconvert the location data into machine-readable form from the printed copy received. This project was implemented on a small scale with the New York Public Library's submission of location reports and the Washington State Library's inclusion of location information in the records submitted for the Cooperative MARC (COMARC) project. (It should be noted that implementation on a small scale refers to the number of libraries participating in this project, not the number of records received. During 1976, for example, the New York Public Library sent approximately 54,000 reports for posting to the RAL.)

The study commissioned by the Library of Congress had a dual purpose: (1) expansion of the RAL data base by cooperative means, which involved identifying machine-readable data bases from which location reports could be obtained; and (2) a survey of users of the microform edition of the RAL to determine their requirements for location information, what improvements could be made, etc. (The second part of the study was expanded to include all subscribers to the NUC, who receive the RAL as part of their annual subscriptions.) As work progressed on the study, the initial plans for a national library and information service network, in which the RAL would fit as the basis for a national location service, were introduced.

A document entitled Toward a National Program for Library and Information Services: Goals for Action, which was prepared by the National Commission on Libraries and Information Science (NCLIS), describes the goals and objectives of such a national network.1/ The Library of Congress commissioned a later study, which was also funded by NCLIS, to determine its role in the emerging national network. One of the principal recommendations resulting from this work was that the Library should take a leadership role in the planning and development of the network. Based on these findings and the pace of development in automation systems and networks, the LC Network Development Office was established in early 1976 so that the Library could participate more actively in networking activities. In the spring of 1976, the first of several meetings of a body that became known as the Library of Congress Network Advisory Group was held. The advisory group, composed of senior representatives from several library systems and networks in this country, served in an advisory capacity to the Network Development Office and was responsible for the compilation of the planning document Toward a National Library and Information Service Network: The Library Bibliographic Component.2/

Besides describing the goals, assumptions, objectives, and functions of the library bibliographic component, the network paper included a description of the initial tasks to be accomplished in the near-term, one of them being the design of the configuration for the national data base(s) for bibliographic, authority, and holdings or location records. The present report provides an initial discussion point for the construction of a national location service, the structure of which should have an impact on the design of the data bases.

The present document is being disseminated as a working paper at this time so that organizations at different levels, e.g., multistate, state, etc., can react to the recommendations in this report in terms of their own planned or operational location services.

The various units within the Library of Congress, e.g., Catalog Publication Division, Cataloging Distribution Service, MARC Development Office, etc., will also be studying these recommendations in terms of their implementation in the Library. It should be noted that some recent developments at the Library of Congress, such as its proposal to convert the National Union Catalog to a register/index format,3/ will have an impact on some of the recommendations in this report, but rather than delaying issuance of the publication until decisions on the book catalog formats are made, we are distributing it as a working paper for consideration by the library community.

Henriette D. Avram
Director, Network Development Office
Library of Congress

December 1977

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1. National Commission on Libraries and Information Science. Toward a National Program for Library and Information Services: Goals for Action. (Washington, 1975). 106 p.

2. Library of Congress Network Advisory Group. Toward a National Library and Information Service Network: The Library Bibliographic Component. Prelim. ed. (Washington, Library of Congress, June 1977). 54 p.

3. "New Patterns Considered for National Union Catalog." Library of Congress Information Bulletin, v. 36, no. 24, June 17, 1977, p. 416-418.

EXECUTIVE SUMMARY

The Register of Additional Locations is a valuable but underutilized part of the national bibliographic service. Its value has been masked by a slow schedule of publication, its dependence on the pricing and publication pattern of the National Union Catalog, and concentration in national planning on bibliographic or cataloging data as contrasted to "finding" or location data.

The RAL has a position with regard to national location information that is similar to the position of the NUC itself with regard to bibliographic information: it is a primary resource whose relative value is being diminished by alternate regional or local sources of information and by competing nationwide efforts.

At present, the RAL is published only as a print (and, recently, microform) register searchable by LC and NUC card numbers and containing library location codes in the form of NUC symbols. Data in volumes 114-18 of the 1968-72 quinquennial and every subsequent annual supplement to date are in machine-readable form; RAL data can also be accessed online in the Library of Congress.

The Library of Congress has most of the technical resources and operating programs to support an expanded set of location services. Demand for location information is demonstrated both in results from this study's user survey and in expanded use of location data in systems such as that of the Ohio College Library Center. Much of the data necessary to expand automated location services will be provided from ongoing multistate or state network projects. Moreover, there is not a national resource other than the Library of Congress that can support the integrated development of bibliographic services.

The conclusion of this study, therefore, is that the Library of Congress should expand its location activities to provide a national location service to complement its developing national bibliographic service. The location service should comprise several discrete efforts and publications as detailed in the body of this final report. Major specific recommendations include:

1. Include all post-1956 locations reported to the National Union Catalog and COMARC in the national location service data base (p. 34).

2. Expand the scope of location reporting from all types of libraries to provide a broader scope and a representative proportion of national accessions. The

number of reports received should be proportional to the number of bibliographic records. Statistical sampling procedures should be established to provide continuing evaluation of the scope and nature of location reports (p. 34).

3. Seek funding to integrate retrospective data bases which provide location data into a national location service data base (p. 38).

4. Organize individual library and regional system support to capture data on located interlibrary loan (ILL) requests, verify bibliographic data where possible, and report to the national location data base those locations found for requested materials (p. 39).

5. Beginning in 1978, publish a National Union Numeric Register including all present RAL reporting and internal location data available within the Library of Congress (p. 41).

6. Beginning in 1979, publish a Title Index to Locations providing access by title for location reports submitted in machine-readable form which provide sufficient data in their formats to support title indexing (p. 44).

7. Segment the publication of the National Union Numeric Register and the Title Index to Locations into ten regional editions showing all included items for which locations are reported within the given region, to begin publication in 1980 (p. 48).

8. Publish by 1979 one retrospective expanded edition of the existing cumulated microform RAL. Merge into the 1968-77 RAL data base all reports through 1978 available in machine-readable form from local libraries or networks (p. 53).

9. Fund a pilot project to develop practical experience with the transmission and distribution of location information as part of the national library bibliographic network effort. Integrate the project with the activities recommended above, but expand its scope to incorporate bibliographic network efforts and local circulation functions (p. 55).

10. Establish the Network Development Office as the agency to coordinate the efforts of the Processing Department,

MARC Development Office, Catalog Publication Division, Cataloging Distribution Service, and other LC operational units with the agencies outside the Library that will have an interest and a part in the development of a national location service (p. 58).

Technical and possibly financial assistance for development may be required for regional and local network efforts by individual organizations, libraries, or vendors. The products of these efforts should be made available by the Library of Congress in machine-readable form, print, and microformats.

[redacted]

Librarians have considered bibliographic information to be the key to providing access to the library. With the growth of networks, they have focused on providing bibliographic information both as a cost-saving measure and as a way of facilitating the sharing of materials.

Location information, which for the purposes of this study can be defined as the data which specify the physical existence of a given piece of a bibliographic entity, has been a much less well-defined resource in library and network management. Location information occupies a role in the access to and delivery of materials which is somewhere between that of the well-defined bibliographic resources (catalogs and related publications) and the role of (more inventory-control or circulation) systems.

Nevertheless, location information has been recognized as an important segment in the national library effort. The primary exception is the services provided by the Library of Congress that have the management of location reporting necessary to the publication of the National Union Catalog (NUC) and its supplement, the Register of Additional Locations (RAL). These services, provided primarily to libraries nationally--in contrast to some bibliographic services developed primarily for Library of Congress internal use--are an important part of the developing national network effort.

This study was commissioned by the Network Development Office of the Library of Congress in recognition of the significance of location information in national bibliographic and network efforts. It was supported by a grant from the Council on Library Resources. The introduction to the issues reviewed and the work done in this project are organized around the references to location information found in the most recent planning document concerned with the development of the national library bibliographic network--the preliminary edition, dated June 1977, of Toward a National Library and Information Service Network: The Library Bibliographic Component.

> "A National Library and Information Service Network . . . would consist of three coordinated parts: 1. A Resource System . . . 2. A bibliographic system designed to provide online/offline bibliographic description for each item held in participating systems, as well as the locations of such materials. . . . 3. A Communications System . . ."[1]

It is implicitly and explicitly recognized that location data are part of a national library and information service network.

[illegible]

"Basic . . . 5. Provide to all the people of the United States, according to their individual needs, [illegible] and convenient access . . ."[2]

[illegible]

[illegible]

"Objectives . . . 5. Participate in the user the location, acquisition, and retrieval of information materials from the most appropriate source."[3]

"The following functions . . . have been identified for the library bibliographic component of the National Library and Information Service Network at this time. . . . 4. Provide a system whereby holdings information and subsequent interlibrary loan activity could be handled in a decentralized mode."5/

It is clear that neither the RAL nor any other present component of the various national bibliographic services is meeting all demand for location information. The RAL and MUC provide the most comprehensive source of location information nationally (and the Mansell National Union Catalog: Pre-1956 Imprints complements them), while the online holdings file at the Ohio College Library Center is the most rapidly growing single source of location information.

A number of card-form union catalogs have been supported by state libraries and regional consortia; such card files were previously the only feasible form for consolidating local libraries' holdings reports other than the MUC. The major files, including those at the California State Library, the Pacific Northwest Bibliographic Center, and the Bibliographical Center for Research, were reviewed during this project to determine the plans and needs of their institutions.

Many local libraries and some consortia or network groups have also made efforts to control location data through their development of automated circulation systems. Such systems not only create a machine-readable record for items circulated (and in some cases all inventory held) by the library but also typically provide detailed location information by branch or site within a system. A primary charge of the present study was to evaluate the potential for integrating these varied location data sources with the existing RAL processing and publication programs.

"During the last two years, the Library of Congress has initiated several projects that are forming the building blocks of the National Library and Information Service Network . . . 2. National holdings . . . the Library of Congress has compiled holdings of monographic titles from 1956 to date in the MUC and its supplement, the RAL. To assist users of the RAL, the Library has recently issued a cumulative microform edition . . ."6/

Two separate but coordinated phases were defined for this project. Phase one's charge was to identify and analyze existing machine-readable data bases which could potentially contribute to the RAL system and also to evaluate the potential for contributions

in the manual mode from libraries not operating data bases. Phase two involved the use of a cumulated microform edition of the RAL, to be produced by the Library, in the analysis of user demand for improved RAL services.

In the performance of phase one, interviews and site visits were supplemented by two library surveys. The first resulted in a location reporting inventory, which identifies more than two hundred potential sources of machine-readable location data. The libraries responding to this survey possessed a total gross location inventory in excess of 25 million records.

The second survey asked for much more detailed information on data base formats from those libraries judged to be most capable of supporting RAL and general location information needs. Over sixty libraries provided detailed information reported in a location data base analysis. From these responses, estimates were made for the support available from American libraries for expanded location information services.

Delivery of the first microform cumulation of the RAL was delayed somewhat by production difficulties, but analysis of user support was given an extra dimension by the decision made during this study to seek location information opinions and preferences from all subscribers to the NUC in addition to those who had purchased the RAL microform edition.

Almost five hundred returns were received from a wide variety of libraries before the cutoff date. A summary of the responses is provided in Table 1 and is instructive regarding libraries' impressions of location needs.

Preliminary conclusions drawn from the analysis of location data bases and of indicated demand were then reviewed with staff of the Network Development Office at the Library of Congress and with representatives of several interested organizations.

> "The Role of the Library of Congress in the Evolving National Network . . . 4. LC should continue to make accessible a register of locations to be searched as a resource of last resort by participants in the National Library and Information Service Network.7/

Detailed descriptions of the analyses, conclusions, and subsequent recommendations make up the balance of this final report. It is worth noting that at the outset, it became clear in the field reviews that although location information had value in local environments, and thus the decentralized distribution seen by many

TABLE 1

RAL USER SURVEY RESULT SUMMARY

Survey Question	Results: Print Subscribers (446)	Results: COM Subscribers (32)
3. Use the RAL for:		
A. Acquisitions purchasing decisions	12	1
B. Interlibrary loan location information	391	32
C. Other purposes	34	4
	437	37
5.1 Have used editions of the RAL:		
A. Printed	424	28
B. Microfiche	3	26
C. Microfilm	1	0
	428	54
5.2 Recommend the RAL be published:		
A. Printed editions only	92	0
B. Microform editions only	38	17
C. Printed and Microform editions	242	15
	372	32
5.3 Recommend cumulation frequency:		
A. Printed greater than microform	75	2
B. Microform greater than print	93	22
C. Same frequency for both	185	5
	353	29
6.1 Major benefits of the RAL reported to be:		
A. Large number of holdings	243	17
B. Acceptable frequency of publication	99	10
C. Acceptable frequency of cumulation	109	13
D. Acceptable regional coverage	76	6
E. Acceptable national coverage	242	18
F. Convenience of usage	256	18
	1025	82

Survey Question		Results: Print Subscribers (446)	Results: COM Subscribers (32)
6.2	Major defects of the RAL reported to be:		
A.	Too few holdings	91	3
B.	Too many holdings	8	0
C.	Not comprehensive at regional level	194	15
D.	Not comprehensive at national level	32	2
E.	Not printed or issued quickly enough	170	4
F.	Not cumulated often enough	117	2
G.	Poor printing quality	31	1
H.	Difficult to use	29	1
I.	Inaccurate information	14	1
		686	29
7.	Improvements suggested for RAL:		
A.	Make more comprehensive	181	12
B.	Make more comprehensive by region	91	18
C.	Cumulate more often	121	9
D.	Print or issue more often	167	10
E.	Other	21	6
		581	55
8.	Membership noted in cooperative ILL system:		
A.	Multistate	68	3
B.	Statewide	191	16
C.	Intrastate	112	18
D.	Other	78	5
		449	47

planners was a desirable feature, the benefits of decentralization would be dissipated if dissimilar regional or local location data systems were incompatible with each other and with location information which would necessarily evolve from national bibliographic efforts.

Thus, the focus of the study turned to planning an integrated system for location information, including the responsibilities at the national and regional level. In this sense, the study's recommendations disagree with the above statement that the LC location register should only be a resource of "last resort."

> "TASKS. The tasks described below provide a blueprint for the development of the library bibliographic component . . . Tasks for the Operational Units of the Library of Congress . . . 5. Design and implement a remote entry input system . . . (to) handle both offline and online bibliographic and holdings records generated outside the Library of Congress . . . 7. Design and implement a retrieval or query system to provide online access to bibliographic, authority, and holdings records . . ."8/

The recommendations in this report are consistent with the task descriptions quoted above with regard to the development of a decentralized input system for holdings (location) data.

It was found that online access to location data--in the absence of consideration of online ILL switching, verification, and accounting (functions beyond the scope of this study)--was not a necessary resource for defined location needs or a part of bibliographic access. Even assuming continuing no-cost maintenance of the online RAL data base at the Library of Congress, the investigator did not think that the functions of location data searching required online interactive access with outside libraries. Thus the study concentrates on the immediate charge of the project--the feasibility and acceptability of microform distribution. It should be noted that distribution of RAL data in machine-readable form is recommended, allowing local or national entities the option of developing such online access as they find desirable.

REFERENCES

1. Library of Congress Network Advisory Group. Toward a National Library and Information Service Network: The Library Bibliographic Component. Prelim. ed. (Washington, Library of Congress, June 1977) p. 13.

2. Ibid., p. 14.

3. Pre-1956 imprints are excluded from the National Union Catalog (and the RAL) because of their coverage in the Mansell publication The National Union Catalog: Pre-1956 Imprints; however, there was no attempt to place such a limitation on this study because location/interlibrary loan needs are not restricted by date of imprint.

4. Library of Congress Network Advisory Group. Toward a National Library and Information Service Network. p. 16

5. Ibid., p. 16-17.

6. Ibid., p. 9.

7. Ibid., p. 2[illegible].

8. Ibid., p. 25

II. HISTORICAL LIMITS OF THE REGISTER OF ADDITIONAL LOCATIONS

In surveying the present uses of the Register of Additional Locations (RAL), a number of limitations in the present location information service provided by the publication can be identified. They serve as a baseline for analyzing the impact of possible changes in the RAL system.

A. Publication Schedule

Coupling the publication of the annual RAL volumes to the production schedule and techniques for the National Union Catalog (NUC) has resulted in extensive delays in distributing RAL data, although the offline batch system for updating locations where an LC card number (LCCN) is available is rapid and efficient.

Over thirty percent of the responses from libraries surveyed, published in Table 1, noted either "not printed or issued quickly enough" or "not cumulated often enough" as major defects of the present RAL. The long cycle required for large-scale printing cannot be controlled by the Library. In addition, the cumulation pattern for the most recent printed volumes was such that during a five-year period each annual supplement issued during the first four years had to be consulted separately. At the end of the fifth year, a quinquennial cumulation was issued. (It should be noted that with the introduction of the microform edition, larger cumulations are not only possible but can be produced at a fraction of the cost of an equivalent printed edition. The Library of Congress has, therefore, decided to eliminate the printed RAL volumes from the forthcoming 1973-77 quinquennial cumulation of the National Union Catalog and to rely on the microform edition of the RAL for larger cumulations.)

B. NUC Holding Locations

Two distinct but related issues concerning the display of location data in the National Union Catalog itself present certain limitations in the use of RAL.

Until 1973, all additional location reports were not automatically included in the RAL. If such reports were received within a publication cycle for a quarterly or annual cumulation, they could appear in the NUC cumulation instead of the RAL. This procedure was changed at the Library so that all additional location reports for titles cataloged by the Library were recorded in the RAL, and it is expected that all additional location reports for items not cataloged by the Library of Congress will also be included

in the RAL in the future. Another limitation relates to the fact that the first reporting library, be it the Library of Congress or an outside library, was not recorded in the RAL. Historically, this may have caused some inconvenience, but it was implicit that an item that had an LC card number would most likely be in the LC collections; items that were not cataloged by the Library would have to be searched in the NUC anyway to obtain the NUC number for further searching in the RAL. This procedure also grew out of the practice of combining the names of the cataloging source and the reporting library in the NUC symbols.

These limitations pose some difficulties in the use of the RAL and NUC by libraries. A library seeking the location of a title is never certain that all locations have been found unless all the right combinations of the NUC cumulations or the RAL were searched. If a library could consult one source to find additional copies of the desired work in a more favorable or convenient location than that of the contributing library, the option to use that source should decrease the lending load on the large research libraries which in the past have contributed the greatest numbers of bibliographic entries and locations to the NUC/RAL.

Another problem relates to the fact that a proportion of NUC or outside entries are later replaced by Library of Congress cataloging. An estimated eight percent of the non-LC entries in an annual NUC volume are replaced.1/ For the 1974 annual, which contained approximately 162,000 outside entries, this replacement might have affected about 13,000 entries. If all location data were consistently entered in the RAL data base, locations posted to the NUC number could be reposted to the LC number automatically. (It should be noted that the Library's machine system for RAL processing has this capability, so if all locations were added to the data base, the seeking library would be able to find all the locations reported to date.)

The third problem is a quite general one, to which any change in the RAL can provide only a partial solution. This is the problem of providing a unique numbering system for bibliographic records not cataloged at the Library of Congress. Most computer-based local systems or networks use a serial numbering technique which assigns a number in increasing order, without meaning or content to the number. In individual systems, manual administrative procedures typically control the assignment of duplicate numbers to discrete bibliographic records. In some networks, control of duplicate number assignment is not provided by the computer system.

The assignment of an NUC number (which resembles an LC card number in that it consists of the symbol "nuc," followed by two

digits for the year and up to six digits for a sequential number, e.g., nuc78-123456; as part of the production of the National Union Catalog is probably the largest number control process covering cataloging not done by an institution itself. NUC numbers identify a discrete bibliographic record, eliminating duplicate entries insofar as possible without examination of the physical item reported by the contributing library. The verification of all reports against the master file of Library of Congress cataloging and the subsequent verification of later reports against established non-LC cataloging makes the NUC the largest controlled site for assignment of unique numeric identification for cataloging not identifed by a Library of Congress card number.

Such a non-LC number will be needed for many functions of a developing network, shared cataloging, and union catalog publication efforts within and beyond the Library of Congress. The inability of the present RAL system to access all of these NUC numbers--or a future generation of non-LC number--because all locations for records with NUC numbers are not included in the RAL is a considerable limitation in the development of a national location service.

C. Location Coding Structure

There are a number of code systems now in use for identifying physical library locations. The symbols assigned for use in the National Union Catalog, published as the Symbols of American Libraries, are the most widely known. Symbols have been assigned by the Library of Congress to many libraries which do not now report actively to the NUC itself and have been assigned as well to cooperative groups and systems. The codes used in other computer-based systems, notably those assigned by the Ohio College Library Center, have little or no relation to the NUC symbols. In general, NUC symbols combine library identification with a geographic coding indicating the U.S. state or Canadian province. Some administrative subdivision relationships are expressed; for example, all units of the University of California are coded "CU-" followed by an alphabetic identifier for the different campuses, e.g., "CU-SC" for the University of California at Santa Cruz. These subdivisions may but generally do not identify branch libraries on a campus or within a public library system.

Fewer than two thousand NUC symbols are active, as contrasted to over thirty thousand discrete library entities found in the files of the Catalog Publication Division. Although actual conflicts in the existing codes are rare (five or six codes are in conflict), the structure of the code system depends on distinctions between uppercase and lowercase alphabetic characters for uniqueness. That is, in using the code for Newburyport (Mass.) Public Library, i.e.,

"MNe," the uppercase "M" and "N" are required to distinguish the code from one established for a Minnesota library coded "MnE" (a hypothetical but possible symbol). The mnemonic codes used to date are effective in printed indexes, but they are not as efficient as a numeric code for the processing required in a national location service.

In addition, the library administrative codes are typically identifiers for the main library agency within a system: "CU," the code for the University of California, Berkeley, is a single location code for a library system with more than one hundred discrete sites on the Berkeley campus; "CLCo" is a single symbol for items located at ninety-four widely spread branches of the Los Angeles County Public Library system. As such systems enter more actively into automated control of their circulation functions, they will require location codings which properly distinguish sites within a system.

For these reasons, the existing library location codes used in the RAL should be reviewed before any wide-scale expansion of the location data base is undertaken. Although a numeric code is more advantageous for some purposes, the existing NUC mnemonic code system is a longstanding one and the best known. The progress of the American National Standards Institute's Z-39 Subcommittee 45 on Library Identification Codes should also be monitored.

D. Numeric Access

The numeric register organization of the RAL tends to limit the breadth of its function. Although many of the libraries surveyed and others using similar numeric registers developed regionally have found the numeric search to be effective for interlibrary loan searches because many of the sources from which inquiries are derived already have LC card numbers, such numeric information is not always readily available with the initial request--or sometimes it is not forwarded with the request--and a preliminary search in the NUC or other indexes organized by author or title is required. These other indexes must also carry all available LC or NUC card numbers.

No quantitative estimates of the costs of such duplicate searching were made during this study, but it appears that searching in the RAL is made more difficult by the lack of more than one access point.

Improvement of access for location information must take into account future plans for the (printed) National Union Catalog and its indexes. The machine-readable data base from which the printed catalog is derived will have much more stringent requirements in its construction than does the location data base and any of its

associated indexes. The building of the two data bases should proceed in tandem, but the requirements for one should not place a restriction on the growth of the other.

B. Scope of Coverage

There are two primary limitations in the present structure of the RBL with regard to the scope of location reporting. First, the administrative policies governing contributions of catalog or bibliographic records to the NUC are controlling the contribution of location reporting. Thus the development of a national location data base is now wholly dependent upon guidelines for contributing bibliographic data which may not be relevant to the sharing of location information.

Second, the present ad hoc services which make up the national location system do not fill all libraries' needs for location information or are likely to have a clear majority of the location data desirable to all types and sizes of libraries. The RBL is also growing less rapidly than the online OCLC data base in terms of locations added. The figures reported by OCLC are 2.9, 5.3, and over 12 million holding statements in July 1974, 1975, and 1976, respectively. Statistics for the RBL machine-readable data base are as follows:

Dates	Number of Titles	Number of Locations
Cumulative file, 1968-73	1,129,247	7,388,120
Cumulative file, 1968-74	1,411,587	9,646,997
Cumulative file, 1968-75	1,769,130	12,041,872
Cumulative file, 1968-76	1,953,233	14,073,143

The scope of the RBL will also be affected by work done at the multistate and state levels where there has been little coordination or cooperation beyond an organization's service area. The actual content of the national location data base can be determined, in relation to the data bases at the multistate or state levels, after further work is done on the configuration of the national library network data bases, which would include bibliographic and authority records as well as holdings records.3/

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III. [illegible]

The difficult part of assessing the value of possible changes in the [illegible] lies in the evaluation of the demand for location information. As outlined in Section II, the BBI is one of a number of relatively unconstrained location services which meet national demand for location information but which do not form an integrated national location service. It appears that none of these services have developed internal systems for demand for location services although some have altered or changed services based on economic (considering cost-flows which consumers) or anticipated utility (developing regional customer responses).

The results of the user survey performed as part of this study reveal a wide variety of tools used by individual BBI or BPI subscribers in the verification and fulfillment of interlibrary loan (ILL) requests and other location functions. The only patterns that could be discerned was an obvious preference for using the telephone or loan request systems based within the library's own state.

However, it is impossible to estimate the degree of overlap between the various location services surveyed. We do not know, for instance, the number of new records (additional card numbers) or the number of new postings (additional location codes for existing card numbers) which would be created by merging the [illegible] Register into the BBI data base.[1] The problem is even more complex when duplication of records among the major location indexes are considered. The effects of increasing the magnitude and scope of location reporting are, therefore, extremely difficult to assess.

Nevertheless, based upon the library community's interest for BBI data as expressed in this study's survey and the user analysis of location services outlined in Section V of this report, several general propositions can be identified which appear useful and economically feasible. This section describes these areas of potential as background to the specific recommendations presented in Section IV.

A. Increasing the Value of Location Reporting

The maximum number of location reports which might be generated in a year nationally is equal to the number of copies of all titles acquired by libraries nationally in that year. This number is not known but can be approximated by dividing total reported book budgets by overall average book prices. One of those interviewed proposed implementation of such a total reporting system, particularly in view of the very wide distribution of the most popular titles

[illegible], but it does appear that some expansion of the ARL [and national] reporting system would be welcomed by libraries and would be beneficial to them.

Tables 2 and 3 show the different ways in which large research libraries treat location reporting, contrasted to their overall acceptance of ARL's 3 shown the major reporting libraries providing ARC locations. The location reporting subcriteria vary from a low of twenty-four percent of volumes added (shared) to over one hundred fifty percent of volumes added (the latter figure presumably reflecting discrepancies in definitions of volumes and titles as efforts to reduce cataloging backlogs in other processing). For ARL members not providing automated summary of ARC location reports (Table 3), ARC reporting ranges from 25 percent to 83 percent of their reported cataloging volumes in the ARIS fiscal library (annual report) or their local bibliographic data base system.

The results of comparing ARC and other data base statistics and reports to the ARC/ARL and other location comparisons can be summarized as follows. (1) No consistent pattern can be found which relates the size of a library collection (or acquisitions) to the reporting of that collection to any location service role; (2) each library can report only a fraction of their acquisitions to the ARC; and (3) annual reports virtually never title and added copy statistics although there is a problem in determining what is meant by "volume" or "title." The diversity in reporting is evident.

There is also considerable variation in reporting to a location service by type of library. State and regional union catalogs tend to be dominated by reports of public library systems. The ARC and RLG receive a very small proportion of reports from other large academic libraries, and the Bibliographic Center for Research provide over seventy-three percent of all locations reported. Libraries belonging to RLG or other networks are not reporting locations to the ARC or RLG in proportion to their current cataloging volume, and libraries building local data bases (bibliographic or circulation) do not report their acquisitions to the ARC or RLG in a consistent manner.

It appears that with relatively little effort on the library of Congress, location information already existing in machine-readable form could be used to increase location reporting to the ARC by significant proportions. Those locations would not provide a substantial cost reduction to the participation of the present ARC, as outlined in Section 4. The remaining questions are whether such additional location data would prove useful to libraries, and would the increase in information be worth eight increases in the cost of the participation?

TABLE 2

SELECTED STATISTICS OF LIBRARIES WITH HIGH VOLUME* REPORTING TO THE NATIONAL UNION CATALOG

Institution	Number of MUC Reports	Total Reported Volumes Added	Annual Data Base Input
Boston Public Library	59,982	249,597	
Brown University	21,374	35,443	
Columbia University	68,751	89,379	
Cornell University	97,494	114,953	52,475
Duke University	67,795	92,043	
Georgia Institute of Technology	24,148		
Harvard University	113,830	178,285	
Indiana University	66,548	226,303	8,229
Iowa State University	23,541	55,330	
J[illegible]t University Library	29,768	38,984	29,229
Kansas State Teachers College	43,650		
Kent State University	35,129	53,146	40,239
Louisiana State University	21,715	53,829	21,918
Miami University	28,025		
Michigan State University	34,408	94,570	
New York Public Library	141,748	92,461	
New York State Library	20,691	32,202	
Northwestern University	34,667	73,241	
Ohio State University	66,060	121,293	50,733
Pennsylvania State University	42,870	80,484	
Princeton University	74,355	100,141	36,934
Rutgers	76,277	101,687	
Southern Illinois University	39,832	106,615	32,972
Stanford University	65,074	109,540	
State University of New York, Buffalo	57,486	72,358	
Syracuse	29,056	36,808	
University of British Columbia	59,815	148,693	
University of California, Berkeley	83,213	144,[illegible]32	
University of California, Los Angeles	75,480	123,102	
University of Chicago	36,568	134,697	
University of Cincinnati	27,679	50,454	
University of Colorado	26,485	81,901	
University of Delaware	24,080		
University of Florida	33,651	53,248	18,104
University of Georgia	52,145	87,135	55,509
University of Illinois, Urbana	58,628	172,269	
University of Iowa	36,497	66,313	

Institution	Number of MUC Reports	Total Reported Volumes Added	Annual Data Base Input
University of Kansas	34,403	54,192	
University of Massachussets	41,166	73,574	
University of Michigan	57,147	119,661	
University of Minnesota	41,972	87,576	
University of Missouri	29,423	44,715	
University of Nebraska	20,426	48,180	27,904
University of New Mexico	34,653		
University of North Carolina, Chapel Hill	46,919	81,970	21,450
University of Oklahoma	24,981	37,239	
University of Oregon	22,033	42,606	
University of Rochester	20,865	50,100	
University of Tennessee	56,337	55,537	
University of Texas, Austin	124,209	207,444	
University of Utah	35,291	72,204	
University of Virginia	60,886	78,288	37,718
University of Washington	35,922	92,486	
University of Wisconsin	105,386	144,388	7,605
Yale University	78,230	168,024	

*Over 70,000 reports annually; libraries that are not members of the Association of Research Libraries do not have an entry under the column of "Volumes Added."

TABLE 3

SELECTED STATISTICS OF ARL MEMBER LIBRARIES NOT PROVIDING HIGH VOLUME* REPORTING TO THE NUC

Institution	Number of NUC Reports	Total Reported Volumes Added	Annual Data Base Input
Arizona State University	2,050	29,621	28,974
Boston University	3,344	44,987	
Brigham Young University		74,052	
Case Western Reserve University	19,376	32,957	
Center for Research Libraries	18,896	29,383	
Colorado State University	7,842	34,787	
Dartmouth College	5,673	31,035	
Emory University	176	51,280	19,889
Florida State University	11,829	42,339	27,768
Georgetown University	3,188	52,806	27,768
Howard University		31,566	
John Crerar Library	1,561	25,389	
Johns Hopkins University	4,247	43,577	16,509
Library of Congress		331,353	
Linda Hall Library	1,202	17,302	
McGill University		65,714	
Massachusetts Institute of Technology	5,471	45,147	
National Agricultural Library		13,649	
National Library of Canada		34,870	
National Library of Medicine		14,042	
New York University	9,312	65,616	19,141
Oklahoma State University	2,054	19,358	
Purdue University	1,731	36,989	5,155
Rice University	6,363	35,085	
Smithsonian Institution	2,571	12,950	
State University of New York Albany		84,660	
State University of New York, Stony Brook	7,213	58,757	
Temple University	12,705	81,377	
Texas A & M University	24	68,078	24,357
Tulane University	3,175	25,518	13,438
University of Alabama	7,546	37,746	
University of Alberta	752	92,055	
University of Arizona	18,534	104,384	
University of California, Davis	5,636	76,384	
University of California, San Diego	18,601	61,901	
University of California, Santa Barbara	17,642	49,724	

Institution	Number of NUC Reports	Total Reported Volumes Added	Annual Data Base Input
University of Connecticut	2,957	89,947	1,090
University of Houston	1,868	186,902	10,423
University of Kentucky	14,974	82,452	27,013
University of Maryland	9,043	87,881	
University of Notre Dame		29,679	2,323
University of Pennsylvania	550	82,967	
University of Pittsburgh	16,212	91,871	
University of South Carolina	14,371	100,022	
University of Southern California		51,982	
University of Toronto	8,476	181,799	
Washington State University	12,699	39,249	
Washington University, St. Louis	18,617	48,617	3,421
Wayne State University	8,968	61,037	15,548

*Under 20,000 reports annually.

The responses of libraries surveyed indicates a strong preference for the use of state-based or nearby intrastate interlibrary loan and delivery systems. Such systems appear to be more fully developed than interstate (e.g., multistate) or national systems and support the view of the National Commission on Libraries and Information Science that state funding, along with federal resources, is one of the few stable sources of library network or resource-sharing support.

Given such a context, it would seem that a national location service should attempt to expand substantially its ratio of locations per title. At present, the National Union Catalog and the Register of Additional Locations provide an average location/title ratio of about six or seven to one. The OCLC data base's location holdings have increased over the past three years from an average of about three to one to just over five holdings statements for each bibliographic record held online. Since present policies governing contributions to the NUC and the RAL place an emphasis on obtaining bibliographic entries as opposed to location reports and the major contributors to the NUC consist of large research libraries, it is unlikely that coverage of the sort contemplated could ever be achieved without a shift in policy with regard to location reporting.

B. Demand-Based Reporting

The various interlibrary loan (ILL), reference, and document systems surveyed handle a substantial volume of requests from individual libraries for desired materials. They expend considerable energy locating materials when locations are not available in union catalogs or other indexes. The results of these searches, however, are not documented so that they could be used for planning purposes in the future, either in those centers or nationally.

Research in document demand, at least with regard to circulated materials, indicates that the best predictor of future demand is present demand--a dictum used in circulation systems to suggest investing in the creation of a computer-based record for materials as they circulate on the theory that those materials are the most likely to circulate again in the future.3/ The same projections may reasonably be applied to location demand. At least one potential function of the RAL would be to serve as a depository of fulfilled searches, whereby an LC or NUC number could be recorded for all items found which had not been listed in the RAL itself or in a machine-based cataloging system which could be presumed to be reporting to the NUC/RAL.

If past demand is a predictor of future demand, entry of all such requests into the national location data base would serve to

make initial searches in the RAL more effective, and to the extent that older materials are requested, recording materials as they circulate would help to supplement any independent effort in conversion of retrospective location data for entire libraries or union catalogs.

Individual catalogs of major libraries and union catalogs of state or regional systems are so massive that they present major obstacles to total retrospective conversion. Although most of these obstacles are financial in nature, they also involve intellectual problems of bibliographic identification and technical problems of large-file data processing.

Conversion of location information from these files as requested by local users or ILL inquiries would meet demand for retrospective materials without requiring a massive investment in the creation of machine-readable location data for materials not actually demanded. (Depending on cost, the conversion of selected records could also include conversion of the entire bibliographic record instead of just an abbreviated holdings record.) Creation of such a retrospective but selective data base would support and broaden a current national location service program without requiring massive handling of manual local catalog or index files.

C. Regional Reporting and Resources

All location reporting services or projects in operation or planned by network developers exist to serve a single primary goal: delivery of a desired item, e.g., a book, journal article, etc., to a library patron from a site distant from that patron. Indeed, many of the present public library circulation systems are placing considerable emphasis on such a location information function to allow patrons access to items not in a given branch but within a single library system.

National network developments have not yet begun to plan for a national delivery system, which must clearly build on the prior development of national bibliographic location services. Resource-sharing agreements and protocols will be required to implement widespread interlibrary loan/document-delivery networks. Such agreements will probably be reached more readily in smaller organizational groups or among units that are part of a single administrative structure (e.g., the MELSA library cooperative in the St. Paul-Minneapolis area or the campuses of the University of California).

In addition, it is unlikely that the development of information technology over the next five to ten years will totally obviate the

impact of geography on document delivery. Telefacsimile of printed and microform documents has, in general, not been widely accepted in Libraries.4/ The impact of the new copyright law on photocopying is not at all clear.5/ It seems reasonable to assume that libraries and their patrons will continue to prefer to request materials from library sites as geographically close to their own library as possible.

D. Locations and Library Size

The traditional practice in interlibrary loan procedures has been to send requests to the largest library available if verification of another specific location cannot be found. That is, if the University of California, Berkeley, campus can verify (through use, in this case, of the U.C. Union Catalog Supplement printed volumes) that the much smaller Riverside campus holds a desired volume, it will request the volume from that library. Otherwise, the normal practice would be for Berkeley to send the request to a library of equal or larger size, e.g., U.C.L.A. or the Library of Congress.

One of the impacts of the growth of union catalogs and location indexes is that the volume of requests can in great part be transferred from larger libraries to smaller ones because holdings can be verified. This routing practice has been followed in many of the manual union catalog operations where requests are distributed so that no single reporting library bears an inequitable load, but with the creation of distributed location files, each library should be able to follow such a procedure without "request switching" which had previously been performed by regional centers such as the Pacific Northwest Bibliographic Center.

Discussions and interviews with staff and member libraries from a number of networks, cooperatives, and interlibrary loan (ILL) centers confirmed the existence of this decentralization of requests, although no quantitative studies had been done by an individual library or network. The most recognizable cases involved smaller libraries which have joined the Ohio College Library Center (OCLC) online system for purposes of preparing their cataloging and have then experienced a marked increase in ILL requests from other OCLC users with whom they had no previous traffic. Ongoing measurement of such traffic would be helpful in network planning but could not be completed within the scope of this study.

These developments indicate that the traditional reliance in the NUC and RAL systems on reporting from the major research libraries may not be the most effective way to support interlibrary resource sharing and places an increased ILL demand on libraries which are now major reporters to the NUC system.

A number of variables affect ILL demand on a particular library--total collection size, loan policy, distance from other libraries, etc. The libraries most active in reporting location information vary widely in their cataloging volume and collection size. Tables 4 and 5 illustrate these variations for the ten most active libraries reporting to the NUC and the ten members of the Association of Research Libraries with the highest rate of accessions. The low relationship between loan activity and NUC reports illustrates two results of the study survey: (1) the NUC/RAL are by no means the sole or even primary source of location information; and (2) there is relatively little relationship between the distribution of location information and its use.

The low relationship between volumes added and items loaned, as shown in the same tables, illustrates the observation that other variables--notably loan policy--are more significant in the use of location information than the relatively general measure of current acquisition budgets. Presumably the study of ILL demand being conducted by the National Commission on Libraries and Information Science will clarify further the factors which influence the use of location information in the actual request for a journal item.

In the context of this section, it is sufficient to note that neither overall collection size nor current acquisition rate determines the relative demand for items. Under these conditions, it does not seem prudent to continue the emphasis upon large research libraries' reports which presently characterizes the RAL location system. The fragmentary evidence presented by networks and individual libraries suggests that a relatively greater proportion of item demand would be met by a location service that described more broadly the holdings of a larger number of smaller libraries.

E. Multiple Copy Holdings

The present location reporting systems, particularly the NUC/RAL, exclude consideration of the existence of multiple copies of a work at a reporting location. Since the major contributors to the RAL have been the major research libraries, this information has not been particularly important. Research libraries rarely acquire more than a single copy of works other than those for course "reserve room" use, which would not be available to other libraries' patrons in any case. The larger research library systems (such as Harvard), however, report independently to the NUC for many of the libraries in the institution, thus automatically providing identification of multiple copies of a work.

On the other hand, the broad distribution of network location reporting and the functions of other location services such as state

TABLE 4

LIBRARIES REPORTING OVER 70,000 ITEMS TO NUC

Institution	Total Reports	Volumes Added	Items Loaned	(Rank)*
1. New York Public Library	141,748	92,461	6,027	
2. University of Texas, Austin	124,209	207,444	12,917	(37)
3. Harvard	113,830	178,285	81,93.	(2)
4. University of Wisconsin	105,386	144,388	79,675	(4)
5. Cornell	97,494	114,953	25,343	(16)
6. University of California Berkeley	83,213	144,332	25,516	(15)
7. Yale	78,230	168,024	19,900	(22)
8. Rutgers	76,277	101,687	31,390	(10)
9. University of Californ.. Los Angeles	75,480	123,102	58,50'	(6)
10. Princeton	74,355	100,141	10,371	(47)

TABLE 5

LIBRARIES WITH HIGH NUMBERS OF VOLUMES ADDED

Institution	Volumes Added	Total Reports	Items Loaned	(Rank)*
1. Boston Public Library	249,597	59,982	25,608	
2. Indiana	226,303	66,548	29,427	(11)
3. University of Texas, Austin	209,614	124,209	12,917	(37)
4. University of Houston	186,902	1,864	5,942	(64)
5. University of Toronto	181,799	8,476	47,344	(8)
6. Harvard	178,285	113,830	81,932	(2)
7. University of Illinois, Urbana	172,269	58,628	79,738	(3)
8. Yale	168,024	78,230	19,900	(22)
9. University of British Columbia	148,693	59,815	22,289	(20)
10. University of Wisconsin	144,388	105,386	79,675	(4)

*Ranking is given on the basis of Items Loaned. Because the ARL statistics included rankings only for university libraries, figures were not available for Boston Public and New York Public

union catalogs have included reports from public libraries and library consortia as well. Such systems typically have a high ratio of number of copies acquired to number of titles acquired. For the most widely acquired popular titles, e.g., Roots, a single system may obtain more copies of a title than the RAL or the OCLC data base will display in institution holding statements. For such titles, capturing all location information about each copy in a national location service could represent an oversupply of location reports. On the other hand, because the titles that are bought in multiple copies by systems (public or academic) are just those expected to be most in demand, some consideration should be given to the role of the reporting of multiple copies in location services. Such reporting could take two forms.

One alternative would be to report the actual location for each copy of the titles reported. That is, a public library system would report not "CLCo" for Los Angeles County's public library system but rather a code for "Hawthorne," a branch location within the system. Another alternative would be to report the system location ("CLCo") but allow for notification in a report of the number of copies resident in the system. A variation would be to report ranges of quantities (one copy; two to five; six or more), which would allow more flexibility for losses and other changes in individual copy locations or status. Based on initial experience, some classes of materials widely held--notably current fiction--might be excluded from consideration.

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IV. TOWARD A NATIONAL LOCATION SERVICE: DEVELOPMENT RECOMMENDATIONS

The efforts recommended in this section are intended to parallel existing procedures and would not supplant them until the newer methods are proven satisfactory. Carrying out many of these proposals would probably result in receiving location reports that have already been recorded in the NAL, but computer programs at the Library of Congress can remove such duplicate reports. The first four recommendations deal with the building or expansion of the national location data base as follows:

1. Include all post-1955 locations reported to the National Union Catalog and CONSAC in the national location service data base.

Considering the multiple potential uses for the current NAL data base and the projected national location service data base, the present restriction limiting additions to the data base to those locations not shown in the National Union Catalog should be eliminated. Specifically, for each reported item included in the MUC, an entry should be created immediately for inclusion in the NAL data base, using the assigned MUC number as the item control if an LC card number (LCCN) is not available.

This recommendation does not preclude the continuation of publishing location information for outside cataloging in the MUC as is now done. Clearly, the source of cataloging for contributed entries is important to other libraries' catalog departments. And pending review of changes in the structure of the MUC itself, at least the present level of location information should be retained in the published MUC. This specific recommendation broadens the scope of the present NAL data base to encompass all items included in the MUC to provide a base for development of the national location data base.

A technical point is that this recommendation makes desirable the transfer of data directly from MARC records, as they are created at the Library of Congress, to the NAL data base, so that each record created at the Library is also searchable by LCCN in that file.

2. Expand the scope of location reporting from all types of libraries to provide a broader scope and a representative proportion of national accessions. The number of reports received should be proportional to the number of copies of titles accessioned, not to the number of bibliographic records. Statistical sampling procedures

should be established to provide continuing evaluation of the scope and nature of location reports.

The second recommendation addresses the current reporting procedures for NAL reporting, which are at present totally dependent on the bibliographic reporting guidelines initially developed in 1957. Examination of NAL and NUC holdings seems to indicate that the frequency of reports is such that a small proportion of bibliographic entries will--if widespread, comprehensive location reporting is developed--account for an excessive number of location reports received. The Monte problem. However, the resolution of this problem should be developed based on the actual growth of location reports.

The recommendation provides for the broadest possible level of location reporting using techniques where the cost for input and addition to the data base is minimal for each location reported. The costs of identifying in local libraries the titles for which shipping a location report should be done would be greater than the costs of receiving that report and then disposing of it later if it becomes superfluous. Two techniques that might be used are: (1) to discard all reports over a certain number received, or (2) to edit the number of reports received by reporting institution or region of distribution.

Five basic sources for the expansion of location reporting are identified below. It should be noted that no expansion of manual reports (those now received as catalog cards) is recommended, and in fact the receipt of manual location data should be reduced with growth of the input techniques recommended. The batch system to input the limited data required for the present NAL and the associated edit and maintenance programs are quite cost effective. It is anticipated, however, that location reporting will in time become part of a two-way computer-to-computer communication which will be necessary to the national bibliographic system, so the cost of data handling may be less than that of the physical card handling combined with the present batch input costs.

The first source for expansion of location information is the use of order data received in the LC Cataloging Distribution Service (CDS). Orders for catalog cards from libraries using CDS can be effective statements of holdings for the title requested. Permission to post such holdings (or selected orders) would have to be obtained from CDS users. For libraries giving permission, posting of the machine-readable CDS records to the NAL would increase the location reporting data base. Card numbers submitted in error to CDS would, of course, be subject to erroneous posting in the NAL.

Within this task is included the updating to the location data base of location data for all catalog records produced by the OCLC network for the library of Congress (LC). Derivation of these location updates on this point (rather than earlier in the OCLC processing stream) would bring distribution of holdings information in line with acquisition of printed cards for LC public catalogs.

The second source for automatic location updates is the application of location updates from bibliographic networks, most of which have computer aided display of interest to a cooperative effort. In each case, the initial stage of this updating (for copy originating on the library) or input) would be combined with machine-based updating and the change integrated with the network architecture effort being coordinated by the LC Network Development Office.

An machine-based updating of locations for which no unique bibliographic identification exists--those catalog records which are presently assigned OCLC numbers in the process of publishing the NUC (card)--would have to be handled as follows. Locations for which an actual OCLC number is provided can be included in an update of locations. Please note, by definition, titles for c. 140 participating and covered by the cataloging library is a go-ahead action of the National Union Catalog.

Locations for which no unique number exists might be handled in one of two ways. On which identifying codes or input codes exceed one million, the accession number of the corresponding records could be utilized to serve as the control number. Then, further generation of holdings by network user libraries would be properly directed to that number. This option, however, presents two problems: (1) the same bibliographic records could receive different accession numbers in different networks (or input as they are presently organized); (2) these numbers would not be retained in the OCLC or LCMS numbers assigned to the bibliographic files in general or a later date.

The alternative would be to defer listing such location updates until a control OCLC number was established. Then for entry of the record in the printed NUC or as part of a national retrieving data base. A decision on the handling of location updates that lack an LC or OCLC card number should be forthcoming as more progression in the configuration of the national data base(s).

The third source for automatic location development of location updates from libraries using bibliographic service networks other than the library of Congress or the bibliographic utilities (e.g., OCLC, Research, etc.). Participants supplying such services through

the use of computer-based systems include Baker & Taylor, Bro-Dart, ?VC/IM, North American Blackwell, Informics, Informatics, General Research Corporation, Science Press, Auto-Graphics, and Josten's. Other service bureau organizations serve one or two library customers in individual locations. Eighteen percent of the libraries responding to the data base format survey used such contractors, and a very large number of libraries receive catalog cards or processing kits from such sources without maintaining a data base.

All major bibliographic contractors now maintain their central data base (from which library demands are met) in a MARC-structured format. Each could report activity against given bibliographic records as a location report (with their customer libraries' permission) although at present none support all details of an operational system for such reporting.

The inclusion of contract bibliographic resources is entirely analogous to the development of network reporting and would allow many libraries an efficient way to report to a national location service and at the same time include the private sector in the development of a national service.

The fourth source for expansion covers the potential contribution of local library data bases not covered by networks or contract services. The initial location reporting inventory developed as part of this study identified about 25 million existing machine-readable records which could be used for location reporting. (This figure excludes OCLC member reports and does not estimate the number of items in these data bases already reported to the MUC/RAL.) Although many of these libraries were not able to provide adequate estimates of their annual rate of additions to these data bases, few of the data bases have been in existence as long as ten years (most less than five), and almost all are efforts involving control of current acquisitions, cataloging, or circulation. A conservative estimate would be that between 2.5 and 5 million location reports could be added to a national location data base by broadening machine-based location reporting to include these records. Again, there is no way of estimating the number of reports already forwarded to the MUC/RAL.

This source can become more significant in the future as automated circulation systems are installed in more libraries throughout the country. Circulation systems which convert records to machine form as books are circulated will support the "demand-based reporting" discussed in Section III.B. Other libraries are using existing data bases (network or contract) to convert entire collections, thus providing additional retrospective location data for specific institutions.

The fifth source for expansion is the inclusion of reports from institutions which have neither computer-based files to support location reporting nor access to such files. Such reports are considered to be the least important form of reporting expansion (although they are the primary form of current RAL reporting) both because most larger libraries already have operating one or more automated applications which could support location reporting, and because the effort to support such independent reporting is greater both for the Library of Congress and for the local library.

Nonetheless, special cases will undoubtedly be identified where reporting of unique or scarce materials is of sufficient importance to justify creation of a machine-readable reporting record solely for the purpose of supporting location access. Such an option should be made available even though the implementation of this reporting input would be the least important priority in developing the input system described above.

3. Seek funding to integrate retrospective data bases that provide location data into a national location service data base.

The current cumulated microform RAL, representing all machine-readable location reports available at the time of publication, lists a total of about 12 million location statements. A much larger data base could be developed using existing data bases identified in the location reporting inventory performed for this study. Between 6 to 8 million locations identified in the inventory are purely numeric-register information, some without the abbreviated main entry or title used for verification in the current RAL system.

In a follow-up data base format survey, the sixty-three libraries responding indicated that just under half the data bases carried the LC card number (LCCN) whenever available. If two-thirds of the records in these data bases actually carried the LCCN, about 10 million retrospective location reports could be generated from the files identified in the inventory alone.

Location information is provided in the Ohio College Library Center (OCLC) system by attaching holdings statements to each bibliographic record in the system. The average use of MARC records was last reported by OCLC as 8.28 uses per catalog record, and, with growth of usage, it can be expected to average about 10 locations per MARC record at present.1/ This yields about 6 million location records which could be generated from OCLC MARC record holdings data. Again, it is not known how many of these location statements have already been reported separately to the RAL.

In addition, OCLC reports about 4.5 uses of OCLC-member input records in addition to the original use, an average of 5.5 uses at the time of reporting in 1974/75.2/ This can be projected to average perhaps six location reports per OCLC record at present. Only about half of these, from best estimates, are derived from LC cataloging and could have LC card numbers in the records. It is estimated that there could be a maximum of 2 million OCLC records which would generate 6 million location reports with LC card numbers. Since the OCLC operating system does not require the input of LCCN if available, a more conservative estimate would be a yield of approximately 4 million valid location statements.

The two subfiles together might generate up to 10 million location statements describing holdings of OCLC member libraries. This estimate is consistent with current cataloging estimates provided by OCLC. It should also be noted that a number of these records represent titles with pre-1956 imprint dates, which would not be eligible for the RAL or its successor. Other network resources are considerably smaller but might generate between one-half to one million location statements from their combined computer files.

Contract bibliographic services have not typically maintained computer records linking customer use to bibliographic records for catalog-card or processing services. The exceptions here are the relatively few libraries which have contracted for operation of their technical services departments under an overall facilities contract. Contractors providing book-catalog or indexing services have, however, generally kept such historical records. No firm estimates of the magnitude of such potential contributions to a retrospective data base could be obtained because of the proprietary nature of the contracts between individual libraries and their contractors, but informal estimates suggest that 3 to 5 million location statements could be obtained in this manner.

From all the sources noted above, between 29 to 36 million location reports showing LCCN and library locations could be merged to produce a retrospective national location data base.

4. Organize individual library and regional system support to capture data on located interlibrary loan (ILL) requests, verify bibliographic data where possible, and report to the national location data base the locations found for these requests.

During the course of this study, the role of the existing manual location services--regional union card catalogs and related ILL centers--was examined, and the potential of these centers to support and participate in a national location service was analyzed.

From the combined perspective of the bibliographic and location services, the ideal solution in dealing with these large manual files would be to support conversion of the information therein. Such an approach, however, has not succeeded nationally as a generalized retrospective conversion effort,3/ although it has been more successful with the specialized serials material being converted for CONSER.4/

It seems unlikely that necessary funds will become available for total retrospective conversion, particularly on a national scale. Therefore, it is recommended that selective conversion of monographic titles--and of location information obtained in response to requests but often not retained for central ILL or union catalog files--be initiated based on the actual demand for materials.

Research regarding in-library circulation of materials and demand for them by on-site patrons indicates that circulation is best projected for the future by observing the pattern of the past.5/ That is, the best measure of how likely a book is to circulate is the frequency with which it has circulated in the past. This recommendation makes the same assumption with regard to demand among libraries as the circulation models have demonstrated for demand within a library.

This recommendation is distinct from efforts relating to the reporting of locations by individual libraries directly or through an intermediate network or contractor. The nature of the arrangements and the agreements required to create such input are quite different. Using "demand reporting," a holding library will have to agree on a blanket basis to have its holdings (retrospective or current) reported by a third party (the requesting library or an ILL agency) rather than through its taking the initiative of creating a catalog or circulation record for a newly-acquired work.

With such an agreement, however, the existing union catalogs could effectively support development of a broadening national system by adding to the data base the most active information from the very large files which have been built up over many years. At the same time, the effort of continuing to add location reports to these files can be taken over by the distribution of location reports through elements of the national location service.

The remaining recommendations focus on steps to provide effective distribution of information in the national location service data base resulting from implementation of the first four recommendations.

5. Beginning in 1978, publish a National Union Numeric Register including all present RAL reporting and transfer to it the internal location data available within the Library of Congress. As rapidly as possible, expand input to this union register to include locations reported by networks, service vendors, and major individual libraries.

The user survey resulted in a picture of a composite demand for RAL-like location information to be made available on a broader scale, more quickly, and with a more frequent cumulation. Both users of the print and of the microform edition reported acceptance of a microform edition of the RAL.

The economics of expanded and more rapid publication dictate the use of the microform medium for the numeric register. With the development of such a publication, it appears that little demand can be expected for a printed RAL-like service, and it is recommended that termination of the printed Register of Additional Locations be considered.

The frequency of publication and cumulation represents a major element of design for a numeric register. The following paragraphs describe patterns recommended for this publication, which will supplement the existing RAL microform edition's coverage from 1968-75.

Data received for 1976 and 1977 should be included in the first numeric register published in January 1978. The frequency of publication should be twice per calendar year. This recognizes the potential role of location information in cooperative buying decisions and the expanding scope of ILL agreements covering currently published materials. A semiannual publication schedule will make possible more effective support for borrowing current materials and identification of locations to support local buying decisions.

The cumulation should be complete for each semiannual issue during the first five years of coverage. As illustrated in Table 6, this cumulation pattern will result in six new editions during the 1976-80 quinquennial period. The first would cumulate all 1976 and 1977 data with locations reported in the first half of 1978; the third, all 1976, 1977, and 1978 data; and so forth. This cumulation and publication pattern should be sufficient to meet the users' needs indicated in the user survey, while attempting to balance these requirements with the practical aspects of processing very large data files and distributing the products.

Input to the 1976 printed annual cumulation of the RAL is reported by the Library of Congress to be 2.1 million location

Table 6

Year	Est. Number of Locations (Annual)	Est. Number of Locations (Cumulative)	Publication Schedule	
1976	2 million	2 million		
1977	3 million	5 million	Edition	Coverage
1978	5 million	10 million	June 1978	1976, 1977, 1st half 1978
			Dec. 1978	1976, 1977, 1978
1979	6 million	16 million	June 1979	1976, 1977, 1978, 1st half 1979
			Dec. 1979	1976, 1977, 1978, 1979
1980	7 million	23 million	June 1980	1976, 1977, 1978, 1979, 1st half 1980
			Dec. 1980	1976, 1977, 1978, 1979, 1980

statements. If the recommendations for expansion of reporting are followed, conservative estimates of reports for the balance of the first five-year period are, as illustrated in Table 6, 3 million for 1977, 5 million for 1978, 6 million for 1979, and 7 million for 1980. This represents a total of 23 million location reports to be published in the sixth edition or an average of about 11.5 million reports per edition.

At the present density of data compaction obtained with the current 24x fiche format, this volume would represent a maximum of about 320 24x fiche or an average publication size of about 160 fiche per edition. Utilization of the 48x reduction (with a similar frame format) would increase the number of frames per fiche almost three times, reduce production costs proportionately as detailed in the following section, and simplify handling.

If the numeric register and related publications are to be developed as continuing Library of Congress services, changing to the more economical 48x reduction may be justified at this time. The investment in new viewing equipment (or lenses for existing viewers) should not deter those seriously concerned with location information if the Library's intentions in this area are made known well in advance of the change. It is therefore recommended that the register and any other microform publications discussed in this report be issued solely in the 48x reduction ratio.

For the publication schedule outlined above, the register remains suited to the fiche format, and such a format is recommended. However, it should be noted that 48x 16mm film is rapidly becoming the favored format in libraries for high-use microform book catalogs, using the Auto-Graphics and Information Design viewers designed for these library applications. This film format may be suitable in the future for developing microform location publications. In evaluating different microformats, however, it is essential that the pricing for them reflect only the incremental cost of production of each format. The differential introduced in pricing the Library of Congress Subject Headings microform edition apparently resulted from charging the computer processing and production costs equally to each format and then developing pricing based on expectations projecting higher total volume sales for the fiche edition. There is essentially no difference per frame in the marginal cost of producing film and fiche formats, and the initial cost of COM frame generation is not significant. The variant formats, if offered, should be approximately equal in price.

Internal format on the recommended fiche could also be altered from that used in the initial edition to realize the economies and efficiencies possible with a format tailored to the needs of the

information presented. The standard 48x format, with the formatting used in the present RAL microform edition, contains three columns per frame or over 850 separate columns on the fiche. The searcher must visually track the fiche vertically and horizontally three times within each frame and must change the vertical location every eighteenth frame to perform a sequential search of the fiche. Several hundred positioning movements can be reduced to approximately fifty by changing the format to that illustrated in Table 7, which is recommended for the numeric register.

In this format, each column which would be created from the 40-character RAL column format begins at the top of the fiche, identified by a large "header" identification, and continues in a single unbroken column to the bottom of the fiche. In using it, the searcher simply scans across the top of the fiche until the appropriate area is located and then moves vertically down the single column in which the desired number is found. (This format is similar to that designed for the experimental ultrafiche edition of Library of Congress Subject Headings.)

Although the suggested format is not a standard micrographics industry internal format, adherence to reduction and overall size standards will ensure compatibility with any standard fiche viewer, and it is recommended that the Library recognize the benefits of such custom internal formats.

It is probable that the publication of the numeric register after 1980 will be influenced strongly by other developments in the national bibliographic service and by changes in the National Union Catalog. At present and within the scope of this study, however, it seems reasonable to project the same cumulation pattern for the second five-year period of the next decade. That is, ten "new editions, 1981-" would be published in the five years, each cumulating all reports received since the publication of the sixth "new edition, 1976-80."

Three variations on this cumulation pattern are suggested below. Choice of any of these options should be reviewed by the Library during 1980 and should be based on analysis of the searches actually performed by libraries against the retrospective and current publications. Such statistical data may be obtained from the NCLIS study presently underway at King Research,6/ or may have to be developed from analysis of interlibrary loan patterns.

First, the 1956-80 data base might be published in a single cumulated edition, totaling almost 50 million location statements and requiring about 275 48x reduction fiche. Second, the 1976-80 cumulation might be continued into the second half of its decade,

TABLE 7

Standard Fiche Format for 48x Register

Proposed Fiche Format for 48x Register

providing sixteen new editions of the publication initiated in 1978 and extending in a single published sequence through 1985. Third, the 1981-85 cumulation might be augmented with retrospective location statements, either by date of entry (for instance, 1979 and 1980 reports) or on the basis of "demand reporting" or the extent of location reports.

6. Beginning in 1979, publish a Title Index to Locations providing access by title for location reports submitted in machine-readable form which provide sufficient data in their formats to support some additional indexing.

The great majority of data bases surveyed support local library applications which require more bibliographic data than provided in the existing RAL file. Relatively little bibliographic data are required to fulfill a high proportion of location searches, which usually consist of requests for locations of a known item. It seemed desirable to investigate the difficulty of generating a non-numeric index which might support such searches, assuming the availability of local or network machine-readable cataloging.

Data elements necessary to support a "Location Index" machine-readable reporting format were determined from a review of major MARC and related bibliographic formats, from an analysis of finding functions, and from discussions with the Network Development Office. Table 8 defines the estimated requirements for the bibliographic elements necessary to support input validation, computer-based sorting, and display of information for searching.

A number of local data bases do not provide all the required data fields in their formats, and although some network formats handle all necessary data elements, little control is exercised over the degree to which local libraries enter data appropriate to those fields. Nonetheless, a large and substantive index to locations could be developed purely through the use of existing, currently generated machine-readable data. Such an index would eliminate the major drawback of the numeric register--the requirement to verify the LC card number for a desired item before searching the register.

Because such an index would not be comprehensive in a broad sense but would be based on the machine-readable data available through the location reporting process, it is recommended that the use of National or Union be omitted from the title of the publication. (It is anticipated, in fact, that the index would support research into the actual uses of the National Union Catalog itself and would be seen as one step in the evolution of the NUC from a manual to a machine-based distribution of bibliographic and location

TABLE 8

LOCATION INDEX FORMAT REQUIREMENTS AND LIBRARY DATA BASE CAPABILITIES

Data Element or Field	Status	Required to: Validate	Sort	Display	Available in machine-readable form from: Networks**	No. of Sites***	% Sample
015 Nat. Bibliography No.	O*	Y*	N	N	Y*	8	12%
017 Copyright No.	O	N	N	N	Y	--	--
020 ISBN	N	Y	N	N	Y	23	35%
025 Overseas Acq	O	N	N	N	Y	--	--
040 Cat. Source	O	N	N	N	Y	14	22%
041 Language	N	N	Y	N	Y	26	40%
043 Geographic Area Code	O	N	N	N	Y	13	20%
050 LC Call Number	O	N	N	N	Y	30	46%
082 Dewey	O	N	N	N	Y	25	38%
086 Govt. Doc. No.	O	N	N	N	Y	16	25%
090 Local Call Number	O	N	N	Y	Y	--	--
1xx Main Entry	N	N	Y	Y	Y	41	63%
24x	N	N	Y	Y	Y	27	42%
260 Imprint	O	Y	N	N	Y	33	51%
300 Collation	O	N	N	N	Y	21	32%
700 Other Added Entries	O	Y	N	N	Y	23	35%

*O = Optional
N = No or Not Required
Y = Yes

**Formal network organizations only

***Element is in record now or planned for the future

information. The index, however, would cover only RAI machine-readable location reports containing title data.)

It is also recommended that publication frequency, cumulation, and format of the Title Index to Locations be the same as those employed for the National Union Numeric Register. For convenience in production processing, it might be desirable to stagger the title index production schedule so that its production is alternated by quarters with publication of a numeric register. There is no necessary relation in timing between the two publications.

7. Segment the publication of the National Union Numeric Register and the Title Index to Locations into ten regional editions, showing all items covered for which locations are reported within the given region, to begin publication in 1980.

The expansion of reporting and the five-year cumulation pattern will result in increasing numbers of locations for each numeric or title entry. Libraries continue to express a preference (as reported in the user survey) for borrowing within a state or nearby multistate region. Moreover smaller libraries have such a low level of interlibrary loan at present that subscriptions to the complete multiyear cumulations of the Register and Index will be overly expensive for their needs. The relatively low number of subscribers to the cumulated microform RAI suggests this pattern. Expansion of regional or national location reporting for specific titles would frustrate local library needs.

It is assumed the national location system should serve not only the research scholar--whose need is intense enough to tolerate the longer period of time required to obtain a unique copy of a work from across the nation--but also the rest of the wide variety of library patrons, many of whom want to find an item nearby and readily available or not at all.

To broaden the support of all types of library location needs, the publication of ten regional editions is recommended. A tentative division of states is outlined in Table 9, generally based on reporting regions developed by the Bureau of the Census and used by the National Union Catalog staff in recording receipts. These regions are fairly consistent with areas of historic library cooperation and newer networking patterns but should not be drawn in final form until consultation is held with state library and network agencies whose efforts these regional editions will support.

Consultation is particularly important because the development of regional registers and indexes will make it possible for many

TABLE 9

DIVISIONS OF STATES BY REGION

NEW ENGLAND

Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

MIDDLE ATLANTIC

New Jersey
New York
Pennsylvania

EAST NORTH CENTRAL

Illinois
Indiana
Michigan
Ohio
Wisconsin

WEST NORTH CENTRAL

Iowa
Kansas
Minnesota
Missouri
Nebraska
North Dakota
South Dakota

SOUTH ATLANTIC

Delaware
District of Columbia
Florida
Georgia
Maryland
North Carolina
South Carolina
Virginia
West Virginia

EAST SOUTH CENTRAL

Alabama
Kentucky
Mississippi
Tennessee

WEST SOUTH CENTRAL

Arkansas
Louisiana
Oklahoma
Texas

MOUNTAIN STATES

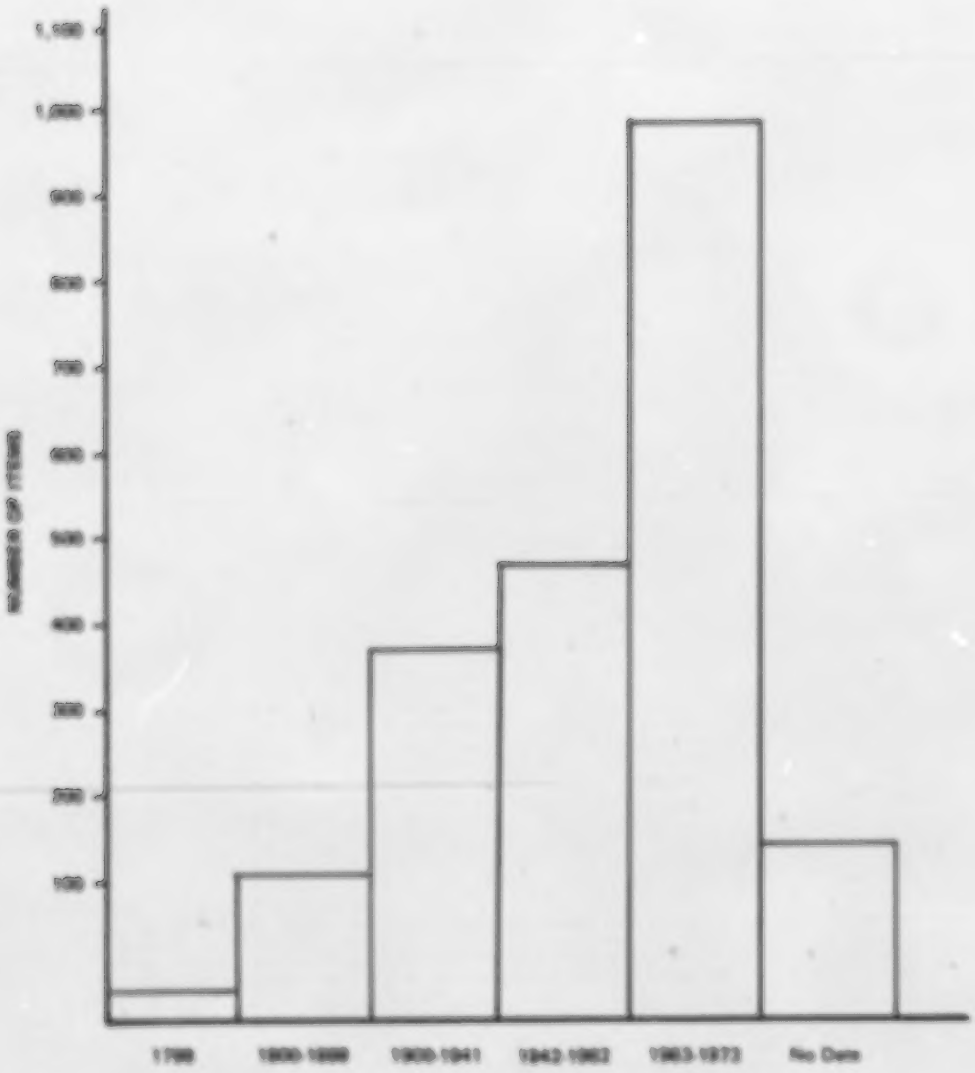
Colorado
Idaho
Montana
Nevada
Utah
Wyoming

PACIFIC COAST

Alaska
California
Hawaii
Oregon
Washington
Canada
Puerto Rico

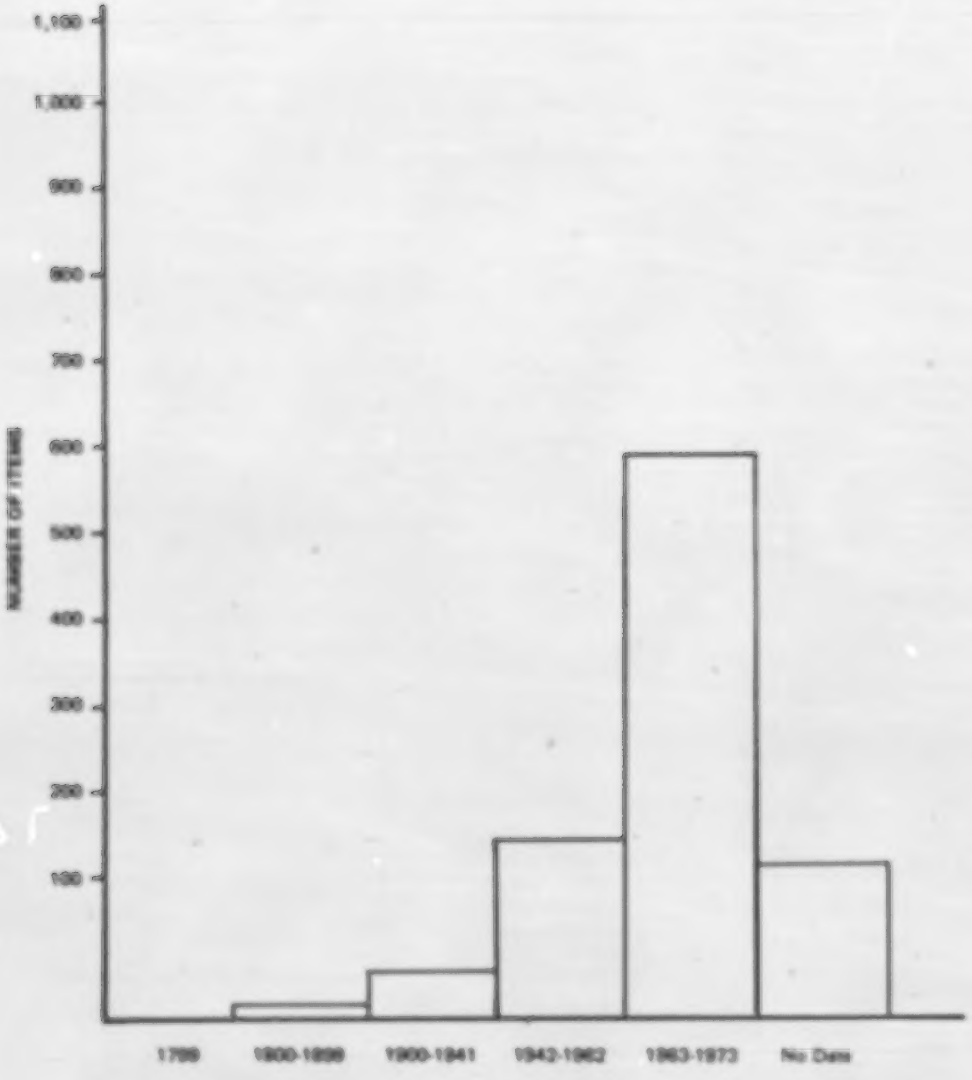
[illegible]

FIGURE 1A



AGE OF ITEMS BORROWED
California State University and Colleges

FIGURE 18



AGE OF ITEMS LENT

California State University and Colleges

The principal advantage of large cumulations is that they reduce the number of individual searches necessary with separate small cumulations. If a high proportion of searches on a regional basis are satisfied with a two-year cumulation of location information, a shorter cumulation period may well serve regional needs. If so, additional cost savings and lower subscription prices are possible. Table 10 outlines the relative costs associated with the two-year or five-year cumulation patterns.

It is the repeated publication of "older" reports which increases the cost of the five-year cumulation about two-and-one-half times over that of the two-year cumulation pattern. Because the economics of microform publication offer no per-frame cost savings with increases in publication quantities (beyond a minimal ten-to-twenty copy range, where setup costs and the original COM run figure in average costs), there is no incentive to the Library of Congress or the library community to create broader (national) or longer (cumulative) editions in order to amortize printing costs against an increased print run. With COM microform publication, ten regional editions would not take away a portion of the potential subscriptions to a national edition unless the national edition would thereby end up with less than twenty to fifty subscribers.

Conversely, a relatively small number of initial subscribers make regional editions feasible. If the regional editions are treated for planning purposes as a group, it becomes unnecessary to determine the value of any single edition and its number of initial subscribers. The regional editions are valuable only as a whole and should be treated as such, so that less active regions are supported by regions having larger numbers of subscribers, if necessary.

8. Publish, by 1979, one retrospective expansion of the existing cumulated microform RAL. Merge into the 1968-77 RAL data base all reports through 1978 available in machine-readable form from local libraries or networks.

Distribution of the present microform RAL indicates a sufficient, if modest, demand for the present form of the retrospective RAL numeric register. Such a retrospective cumulation will gain added value with increased size and will retain a lasting value if coupled with a current register publication program.

Merging external data bases is a task which can be performed with existing Library of Congress computer programs. From the data base survey performed and from estimates of the presence of LC or NUC card numbers in network data bases, it seems likely that about 15 million locations could be added to the existing retrospective RAL data base (adding an unknown number of new entries). The size

TABLE 10

EFFECT OF CUMULATION PATTERN ON PUBLICATION COST

No. of Locations/Year = 2 Million Cumulation Twice/Year

Total No. Entries at Publication	Cumulative Sequence 5 yr.	2 yr.	Average 5-year	Average 2-year
1 million	1	1		
2 million	2	2		
3 million	3	3		
4 million	4	4		2.5 million
5 million	5	1		
6 million	6	2		
7 million	7	3		
8 million	8	4		2.5 million
9 million	9	1		
10 million	10	2	4.9 million	1.5 million

Total Locations Published, 5 years (million)		Subscription Price (at RAL Microform rates)
5-year cumulation	49	$ 196
2-year cumulation	21.5	86

Cost Ratio, 2-year compared to 5-year cumulation: 44%

of the ultimate publication could be controlled by selecting external data bases in a priority sequence and placing arbitrary limits on the ultimate number of locations selected.

A publication of such size, ignoring costs incurred in the handling of many external data bases, could be provided on 48x fiche in about the same number of fiche and at about the $35 publication price of the currently available 24x RAL. The feasibility of such a microform expansion of the current microform RAL and the demand for it, however, are not the primary concerns of this recommendation. The development of such a historical union location data base could be of continuing support to both the design and the operation of the national bibliographic service.

From the analyses performed in this study, it seems that a major obstacle to the technical design of the national bibliographic system is the absence of any hard information on the distribution of bibliographic records among libraries in the United States. A greatly expanded reporting sample of locations on a retrospective basis (coupled with ongoing COMARC and location reporting over the next few years) will provide the statistics necessary to estimate libraries' demands for Library of Congress and each other's cataloging and demands for materials represented by that cataloging.

The development of the retrospective location data base is recommended, therefore, both on grounds of the relative ease of development and the demonstrated demand for it and because of the planning data which such a project could provide. The limitations on the Library of Congress in publishing pre-1956 location reports because of contractual arrangements with Mansell must, however, be considered.

9. Fund a pilot project to develop practical experience with the transmission and distribution of location information as part of the national library bibliographic network effort. Integrate this project with the publication project recommended above, but expand its scope to include integration with bibliographic network efforts and local circulation functions.

The study for which this document is the final report has excluded from its scope the specification of many location problems which have an impact on local and regional network bibliographic developments and individual library circulation systems. The integration of location information with a national interlibrary request system--and a request system which will have to consider guidelines provided by the National Commission on New Technological

Uses of Copyrighted Works (CONTU) and the new copyright law--has not been considered.

It is hoped that most issues directly related to the actions of the Library of Congress and the national network effort have at least been identified. However, operational experience with the use of extended location services and their integration with bibliographic services is needed. Both the national network effort and the National Union Catalog will affect and be affected by changes in Library of Congress support of location services.

Definition of such a project is outside the scope of this study report, but discussions with Washington Library Network (WLN) representatives indicate a high degree of awareness of the integration needed in the state with developing circulation systems and with the Pacific Northwest Bibliographic Center's card-form union catalog. Initial discussions with WLN should focus on a project that could include two or three organizations involved with circulation systems, card-form union catalogs, etc.

10. Establish the Network Development Office as the agency to coordinate the efforts of the Processing Department, MARC Development Office, Catalog Publication Division, Cataloging Distribution Service, and other LC operational units with the agencies outside the Library of Congress that will have an interest and part in the development of a national location service.

It should be explicitly stated that the scope of this study--the RAL data base and current publications sponsored by the Library--will be expanded if a broader location service is developed. Integration of location planning with national bibliographic network efforts will be required in the following areas. (1) Problems associated with locations for non-monographic materials (i.e., those not now included in the RAL) will have to be explored, including the questions associated with representation of serial holdings. (2) Development of standards for codes and library identification is necessary for this and other network tasks. (3) Publication of LC and national network products in print and microform will benefit from coordinated efforts, the primary example being the National Union Catalog. (4) Distribution of machine-readable location records will need to be planned in concert with other bibliographic services.

The above reasons, all related to network planning issues, are the rationale for the Network Development Office to be the center for the initial planning for a national location system.

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V. COSTS

Presented here are the cost estimates for two products discussed earlier: the National Union Numeric Register and the Title Index to Locations. An additional product, the Regional Location Index, is not discussed in terms of costs because the expected method of production for the two primary publications would include that subset almost automatically. The only additional cost expected is the COM run for each of the regions, and that is practically negligible in terms of the total.

Before discussing the tables which summarize the expected production costs, it is appropriate to make explicit some of the assumptions that form the basis for the estimated levels of expenditure. Numbers have been derived both from LC workload statistics and from the NUC Register of Additional Locations: Reports through December 1975 in microform. Based on that edition of the RAL, there are approximately six locations per title included. On the average the number of locations per frame is 417, and for all costing purposes it was assumed that 48x microfiche would be used, giving a total number of locations per fiche of about 120,000 (with 288 frames per 48x fiche). For general cost purposes, the selling cost of $35.00 for the microfiche edition of the RAL was used. This gives a per fiche subscription price (in 24x) of $0.252. (Duplication costs would be about $0.10 or less per fiche.) Although it is recognized that there may be some slight difference in the cost of producing 48x fiche instead of 24x, the decision was made to use the $0.252 figure as representative of the cost of production including various development and management costs.

All of the following tables are based on estimates of the number of locations that have been given for the various alternate products, with the exception of the table concerned with the Title Index to Locations. The basis for that table is explained later in this section. It should also be noted that the cost columns in the following tables give costs on a per copy basis.

Table 11 is concerned with the cost of producing the initial COM version of the cumulated RAL for 1976-80. In the "Dates" column, numbers such as "78a" and "78b" refer to the first and second halves of 1978 respectively. The number of locations is derived from estimates made on the basis of statements in earlier sections of this report on sources of location information. The number of fiche is calculated on the basis of 288 frames per fiche and assumes the same frame content as the "THRU 1975" version of the RAL. Cost is computed at the rate of $0.252 per fiche. The total cost is simply the sum of the individual issue costs.

TABLE 11

NUNR 1: FIVE-YEAR CUMULATION, 1976-80, SIX ISSUES

Dates	Locations (in millions)	Number of fiche	Cost
(1) 76,77 + 78a	7.5	63	$ 15.75
(2) (1) + 78b	10.0	83	20.75
(3) (2) + 79a	13.0	108	27.00
(4) (3) + 79b	16.0	133	33.25
(5) (4) + 80a	19.5	163	40.75
(6) (5) + 80b	23.0	192	48.00
		TOTAL	$ 185.50

TABLE 12

NUNR 2: FIVE-YEAR CUMULATION, 1981-85, TEN ISSUES

Dates	Locations (in millions)	Number of fiche	Cost
(1) 81a	4.0	33	$ 8.25
(2) (1) + 81b	8.0	67	16.75
(3) (2) + 82a	12.5	104	26.00
(4) (3) + 82b	17.0	142	35.50
(5) (4) + 83a	21.5	179	44.75
(6) (5) + 83b	26.0	217	54.25
(7) (6) + 84a	30.5	254	63.50
(8) (7) + 84b	35.0	292	73.00
(9) (8) + 85a	39.5	329	82.25
(10) (9) + 85b	44.0	367	91.75
		TOTAL	$496.00

Table 12 is based on the same assumptions but shows the number of locations and fiche cumulatively for the period 1981 through 1985 in half-year increments.

Table 13 is a cost estimate for a publication which would begin by including the period 1956 to 1975 as a first issue. Following that, the second issue would be 1976, 1977, and the first half of 1978. At that time the cumulation pattern becomes the same as in Table 11 except that the data from 1956-75 are always included. All other figures are computed as shown above.

Table 14 is essentially a combination of Tables 11 and 12 and reflects the cost of producing a cumulation that runs on a ten-year cycle rather than a five.

Table 15 is a costing for a publication that begins each five-year cycle with a cumulation including the last two years from the preceding cycle. In the case of the example then, the first issue would include 1979, 1980, and the first half of 1981. After that the pattern is the same as in Table 12. Table 16 summarizes the alternatives given in Tables 11-15.

There are some qualifications that need to be considered when attempting to interpret the tables and to extrapolate from them. The most important is that most of the estimates of the volume of locations are based on the recommended sources of data discussed earlier in the report.

A second consideration is that for the first few years, such a product will be in an unstable state. New sources of location data are being tapped, and increasing coverage of the bibliographic output is being gained. Therefore, it is likely that there will be fluctuations in the size of such products, major differences in the average number of locations per title over time, and other variations in both content and coverage, practically none of which will be linear in nature. The main result of such changes is that great care must be taken in trying to derive some estimate of the annual cost to the subscriber of a five-year cumulation that is issued in half-year increments. For such estimates, it is recommended that the figures in Table 12 be used since with regard to some changes, the system will have reached a "steady state" by 1980 or so, and most of the differences from year to year will be the result of predictable growth factors.

Table 17 presents some costs estimates for the projected title index to the location data. Again, some assumptions that were made in constructing the numerical estimates must be stated. It was assumed, first of all, that the Title Index to Locations will not

TABLE 13

WORK 3: FIVE-YEAR CUMULATION, 1976-80, WITH BACKFILL, 1956-75

Dates	Locations (in millions	Number of Picks	Cost
(1) 56-75	10.0	83	$ 20.75
(2) (1) + 76, 77, 78a	17.5	146	36.50
(3) (2) + 78b	20.0	167	41.75
(4) (3) + 79a	23.0	192	48.00
(5) (4) + 79a	26.0	217	54.25
(6) (5) + 80a	29.5	246	61.50
(7) (6) + 80b	33.0	275	68.75
		TOTAL	$331.50

TABLE 14

MODEL 4: TBM-TBAS CUMULATION 1978-83

Dates	Locations (in millions)	Number of fixes	Cost
(1) 78, 77, 78a	7.5	63	$ 15.75
(2) (1) + 78b	10.0	83	20.75
(3) (2) + 79a	13.0	108	27.00
(4) (3) + 79b	16.0	133	33.25
(5) (4) + 80a	19.5	163	40.75
(6) (5) + 80b	23.0	193	48.00
(7) (6) + 81a	27.0	225	56.25
(8) (7) + 81b	31.0	258	64.50
(9) (8) + 82a	35.5	296	74.00
(10) (9) + 82b	40.0	333	83.25
(11) (10) + 83a	44.5	371	92.75
(12) (11) + 83b	49.0	408	102.00
(13) (12) + 84a	53.5	446	111.50
(14) (13) + 84b	58.0	483	120.75
(15) (14) + 85a	62.5	521	130.25
(16) (15) + 85b	67.0	558	139.50
		TOTAL	$1,160.25

TABLE 10

[illegible]: Five-Year [illegible], 1981-85, With Reference, 1979-80

Series	Generations (in millions)	Number of Files	Cost
(1) 79 + 80 + 81a	17.0	340	$ 85.00
(2) (1) + 82a	21.0	370	63.70
(3) (2) + 83a	25.5	310	93.00
(4) (3) + 82b	28.0	250	63.00
(5) (4) + 83a	34.5	299	75.00
(6) (5) + 83b	39.0	325	81.00
(7) (6) + 84a	43.5	360	90.70
(8) (7) + 84b	48.0	400	100.00
(9) (8) + 85a	53.5	430	108.50
(10) (9) + 85b	57.0	475	118.70
		TOTAL	$761.00

[illegible] (Table 12)

[illegible] Table 2

[illegible]	Retail cost	Average cost per glass	Average cost per litre	Average cost per capsule (Fixed collection)
[illegible] (Table 11)	$ 185.50	$ 37.10	$185.50	$0.00000007
[illegible] (Table 12)	$ 650.00	$ 65.00	$650.00	$0.00001127
[illegible] (Table 13)	$ 115.50	$ 11.50	$287.50	$0.00001994
[illegible] (Table 14)	$1,100.00	$110.00	$715.00	$0.00001710
[illegible] (Table 15)	$ 787.00	$158.00	$787.00	$0.00001368

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TABLE 17

TITLE INDEX TO LOCATIONS

Date	Titles (000's)	Number of fiche (titles)*	Cost (titles)	Number of fiche (locations)**	Cost (locations)	Total Number of fiche	Total cost
(1) 1976, 77, 78a	1112	38	$ 9.50	63	$15.75	101	$ 25.25
(2) (1) + 78b	1366	46	11.50	83	20.75	129	32.25
(3) (2) + 79a	1646	56	14.00	108	27.00	164	41.00
(4) (3) + 79b	1926	65	16.25	133	33.25	198	49.50
(5) (4) + 80a	2233	75	18.75	163	40.75	238	59.50
(6) (5) + 80b	2340	80	20.00	192	48.00	272	68.00
						TOTAL	$275.50

Average cost per year = $55.10

Average cost per title = $.000118

*This represents the average number of fiche required to display the number of titles given with approximately 50 characters of title data per title

**This represents the average number of fiche required to display location information at about 120,000 locations per fiche

be an index to the National Union Numeric Register. Instead, it will be a separate publication that can be used alone. In terms of content, it presents in title order the first fifty or fewer characters of the title, the same author information that is included in the numeric register, the LC or NUC card number, and the location symbols. For purposes of approximation, it was assumed that the average record will carry fifty characters of title data. The production cost on a per copy, per fiche basis is the same $0.252 used above. The estimate of the number of titles that would be added each year for the period 1976 through 1980 was derived from analysis of the "THRU 1975" data. It should be recognized, however, that there is no good source for the information needed for a truly accurate estimate of such figures. At any rate, the estimates derived are:

Year	Number of Titles
1976	403,000
1977	455,000
1978	508,000
1979	560,000
1980	613,000

The figures above represent data for the cumulative number of titles included in each of six publications. The pattern of cumulation is the same as for the alternative described in Table 11 above. The number of fiche and the cost are given at each cumulation point separately for the title data and the other information contained. The total cost would be the cost to the user on a per copy basis, and the subtotals are presented simply for comparative purposes.

One comment of particular importance is that the number of titles added to this index will reach a steady state by approximately 1980. The major implication of this for production of a tool like the index is that the cost of including title data will also reach a steady state and will remain a constant yearly factor from that point. If these estimates are reasonably accurate, this factor can be expected to be approximately $20.00 per year independent of the number of locations reported. As the numbers of locations grow, the cost of the title data will of course become a reduced proportion of the total cost of the product.